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**[By email only]**

Your reference: L/2015/00427/7  
Our reference: MLA/2015/00088/6

31 January 2025

Dear Mr Ridley,

**L/2015/00427/7 Mid Licence Sediment Sampling Review – Condition 5.2.3**

The Marine Management Organisation (MMO) received a submission to the above on 12 November 2024. The MMO has reviewed the reports (MMO\_Results\_Template - MAR02481 V2 & MMO Results Template MAR02499 V2, L/2015/00427/7.2) along with our advisors Centre for Fisheries and Aquaculture Science (Cefas). The reports were submitted in response to the following marine licence condition:

**Condition 5.2.3:**

A regime of future sediment sampling is undertaken by PD Teesport, of at least three yearly intervals, which must be agreed in advance with the MMO. Samples must be collected, analysed and the report of their notification signed off prior to dredging in the fourth and subsequently the seventh and tenth year of this licence.

**Reason:** *To ensure only suitable material disposed of at sea.*

**Condition 5.2.9:**

If disposal of more than 1 million tonnes wet weight is required at Tees Bay A (TY160) in 2022, 2023 or 2024, then additional sediment sampling requirements must be agreed with the MMO. Agreed sample results must be submitted to and approval given in writing by the MMO prior to disposal of material above 1 million tonnes wet weight per annum.

**Reason:** *To ensure only suitable material is disposed of at sea and that the works continue to meet UK OSPAR requirements.*

After full review of the reports and advice received from CEFAS, the MMO has the following comments to make:



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## **Comments for Action**

Please ensure all information submitted under SAM/2024/00054 meets UK signatory obligations for OSPAR & LC/LP annual dredge & disposal returns. This includes ensuring the following corrections are undertaken:

- Fully complete application information tabs on all relevant sampling results to ensure it reflects the correct name (as per sampling plan), sampling depth, application number, sampling location.
- Amend all sample co-ordinates so that they are in decimal degrees (WGS84)

## **PBDE Sample Results**

PBDE sampling indicates that BDE209, 99 and 100 are higher than recommendations as per Mason et al (2022). They are higher than their lower assessment criteria (LAC) but lower than the Higher assessment criteria (HAC) in 16, nine, five and one sample sites respectively. As there is no Total Organic Carbon (TOC) provided there is no way to normalise the PBDE results provided. If they TOC is above 2.5% the levels would be reduced. Historically it has been noted by CEFAS that they are greater than 3% therefore there is risk may be lower than what is observed. The MMO are concerned with the levels shown from PBDEs. See figures 1 and 2 below.

Due to the increases observed in BDE99 and BDE209 since 2023 the MMO would request the addition of a licence condition to include the sampling of the dredge material for PBDEs in a year to monitor that levels remain at levels previously observed and are not increasing. This is to ensure the material can continue to be disposed of to sea. The MMO reques that the analysis of TOC is also undertaken with these analyses, to be able to understand the availability of the contaminant and evidence perceived risk. This will be factored into a renewal of the current licence if submitted.

Further information on the PBDE analysis, and a full review of analysis sent to the MMO can be found in the annex of this letter

## **Conclusion**

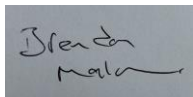
The MMO is content that the reports are sufficient to discharge 5.2.3 and 5.2.9 of marine licence L/2015/00427/7.

However due to the increases observed in BDE99 and BDE209 since 2023 it has been advised for the addition of a licence condition to include the sampling of the dredge material for PBDEs in a year to monitor that levels remain at levels previously observed and are not increasing. This is to ensure the material can continue to be disposed of to sea. It is also advised the analysis of TOC is also undertaken with these analyses, to be able to understand the availability of the contaminant and evidence perceived risk.



If you require any further information please do not hesitate to contact me using the details provided below.

Yours Sincerely,



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# Annex 1

## Particle Size Analysis

The PSA indicates that sediment composition is predominantly composed of silt / clay (69% - 98%) followed by sand (1% - 31%) and little to no gravel (0% - 2%) excluding samples 24 (Chart 9) and 25 (Chart 10) which were both predominantly composed of sand (64%) followed by silt / clay (36%) with little to no gravel. This composition is in line with the current licence material type.

## Trace metals

Analysis of all trace metals (including arsenic) showed levels greater than Cefas Action Level 1 (AL1) in multiple samples but none were greater than Cefas Action Level 2 (AL2) in any sample. All levels of trace metals above AL1 were closer to the AL1 threshold than to their respective AL2. Levels below AL1 were also observed for all trace metals across multiple samples. The material in respect to trace metals is considered acceptable for continued disposal to sea, in this case to Tees Bay A (TY160) disposal site.

## Organotins

All levels of DBT and TBT were below AL1 with the majority below the limit of their detection (LOD). Only six samples (5, 6, 8, 11, 13, 16) contained levels above the LOD but below AL1 for DBT, whilst this was the case for nine samples (3, 4, 5, 6, 8, 11, 12, 13, 16) for TBT. Therefore the material in respect to organotins is considered acceptable for continued disposal to sea, in this case to Tees Bay A (TY160) disposal site.

## Polycyclic Aromatic Hydrocarbons

In the absence of a defined AL2 for PAHs, Cefas utilise the Gorham-Test approach (Gorham *et al.*, 1999; Long *et al.*, 1995; 1998). This is an effects-range approach which considers the sum total of a number of the low molecular weight (LMW) PAH analytes which are seen as acutely toxic, and a selection of the high molecular weight (HMW) PAH's that are considered to be more long term acting (i.e. carcinogenic) which are compared for each sample for two effects ranges. Total values of the LMW PAHs and the total of the HMW PAHs are calculated and then compared to threshold values. If a total value (for either LMW or HMW selection of PAHs) does not exceed the effects-range low (ERL), the indication is that the sediment in the sample can be considered low risk. If a total value exceeds the effects-range median (ERM) for either the LMW or the HMW total values, it can be considered higher risk, with more likelihood of harm occurring. The LMW and HMW levels are displayed in Figures 2 and 3 below.



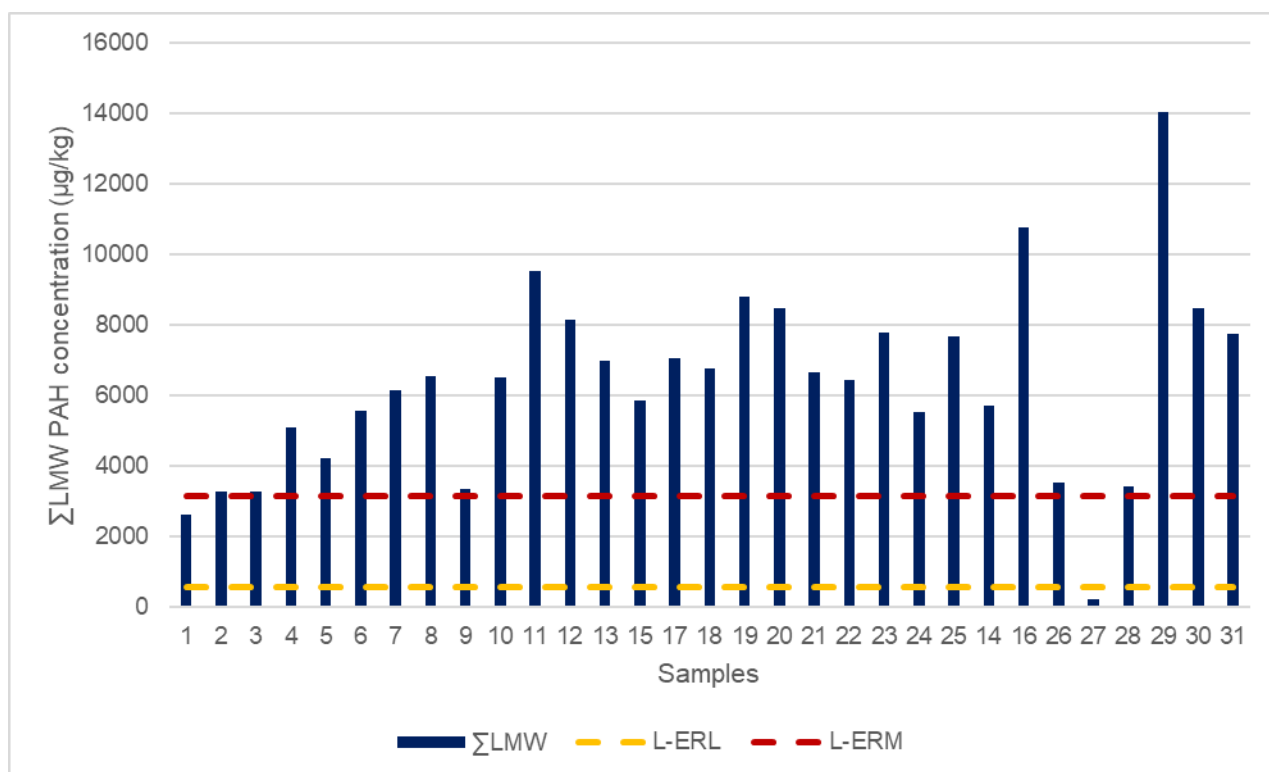


Figure 2: LMW PAH levels detected in Tees and Hartlepool in 2024 (obtained from documents cited in paragraphs seven and eight).

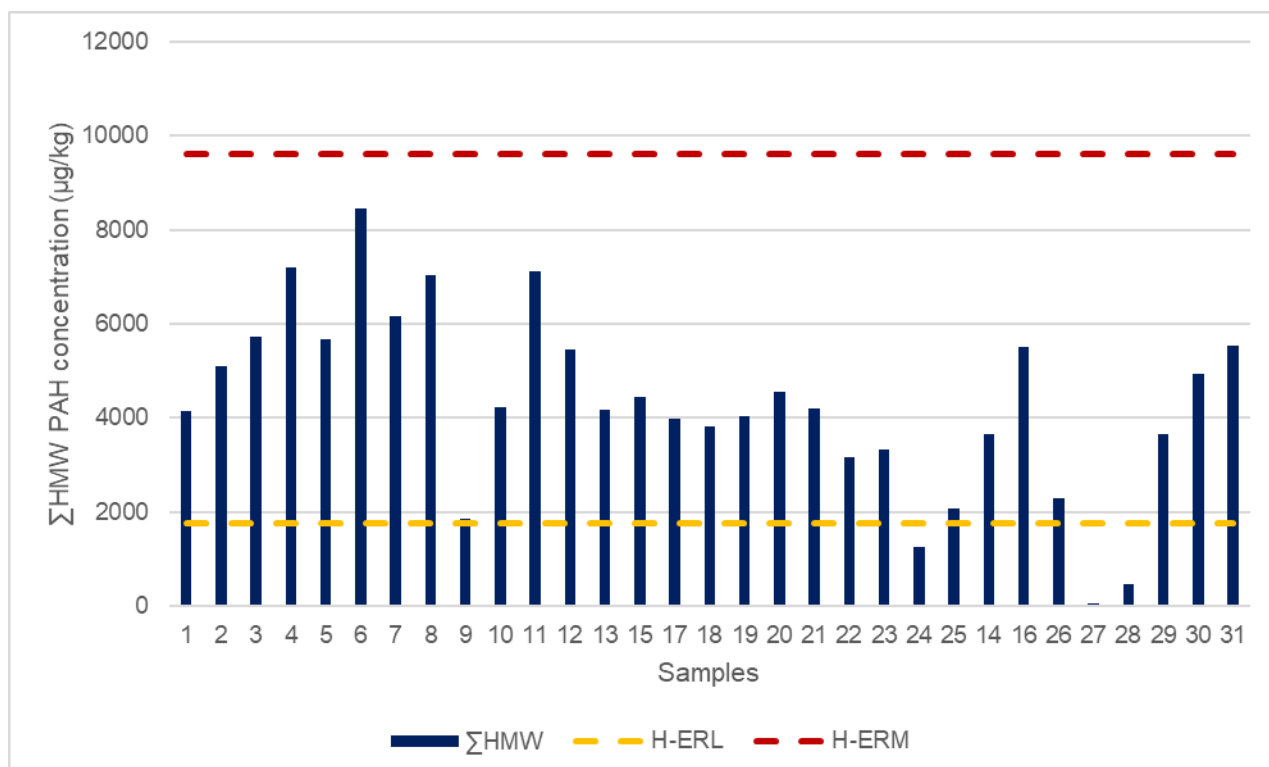


Figure 3: HMW PAH levels detected in Tees and Hartlepool in 2024 (obtained from documents cited in paragraphs seven and eight).



Out of the 31 samples analysed for PAHs 29 were greater than the LMW ERM ranging from around the ERL threshold (3,160 µg/kg) to 4.4x the ERM threshold (14,047 µg/kg). The remaining two samples were 1 (Figure 1 Exolom Riverside) and 27 (Figure 1 Chart 12); sample 1 contained LMW PAH levels greater than ERL but close to the ERM threshold whilst sample 27 contained levels of LMW PAHs less than ERL. Only one sample, sample 6 (Figure 1 Chart 3), was close to, but below, the ERM threshold for HMW PAHs. All remaining levels of HMW PAHs were below the ERM except for three samples which were below the ERL. The three samples below ERL were sample 24 (Figure 1 Chart 9), sample 27 (Figure 1 Chart 12) and sample 28 (Figure 1 Hartlepool Channel). Of note is that sample 27 is the only sample to contain levels of both LMW and HMW PAHs below their respective ERLs.

The levels of LMW PAHs alone would normally preclude the material from continued disposal to sea due to levels that would pose a risk to the marine environment, however, the river Tees is historically an area that exhibits PAH levels higher than other UK rivers due to industrial sources and history of the river (Nicolaus *et al.*, 2015; Kirby *et al.*, 1999), especially acute LMW PAHs. This has been evident throughout the current licence whereby both LMW and HMW levels detected in sediment sampling and analysis since 2015 have shown elevated levels of LMW and HMW PAHs that are greater than their respective ERLs and ERMs (documents cited in paragraphs nine and ten). It is prudent to compare the current results to historical levels detected within the duration of the licence so that local and regional context of these results are considered; these are visualised in Figures 4 and 5 below.

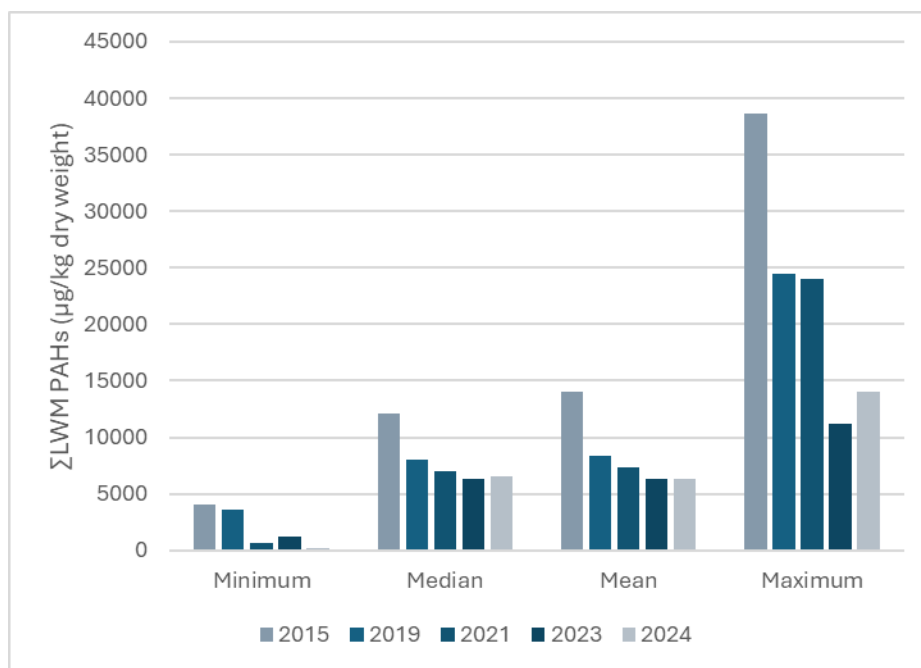


Figure 4: LMW PAH comparison within Tees and Hartlepool from 2015 – 2024.



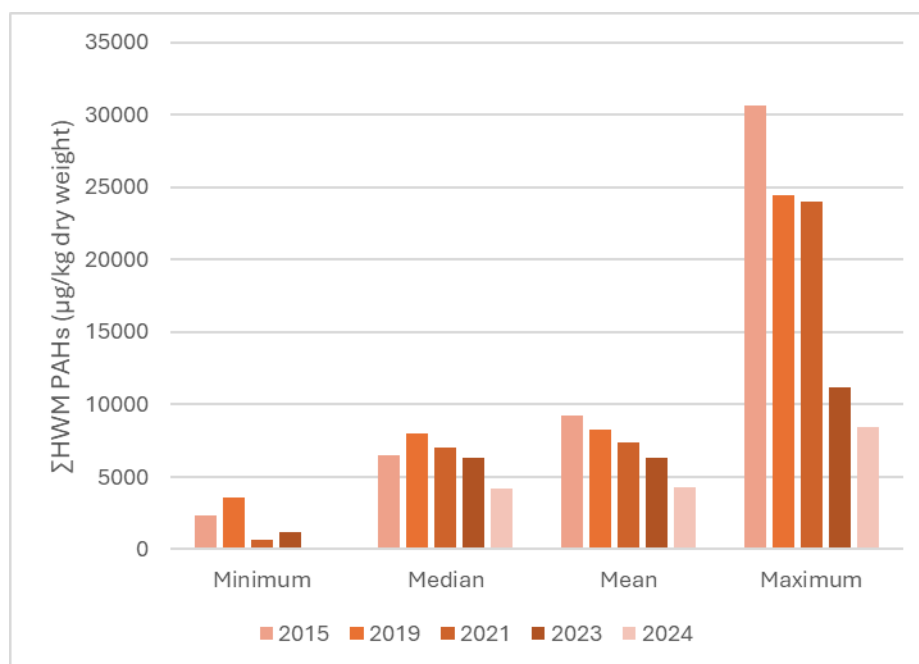


Figure 5: LMW PAH comparison within Tees and Hartlepool from 2015 – 2025.

It is observed that levels of LMW PAHs have maintained a similar level since 2023; the minimum value is less than 2023, the median and mean are of a similar value to 2023 but the maximum has increased since 2023. Viewing the levels of LMW PAHs since the start of the licence in 2015 indicates that they have continued to drop over the years with the Tees and Hartlepool dredge area. Interpretation of the HMW PAH levels is more clear cut with all factors (min, median, mean and max) all decreasing in value since 2015, and in broader terms all seeing a decrease every year since 2019.

Considering these results holistically; in both the local context of the river Tees and in comparison, to previous mid-licence data, the PAH results alone do not preclude material from continued disposal to sea, in this case to Tees Bay A (TY160) disposal site.

### **Polychlorinated biphenyls**

In total ten samples were analysed for PCBs, in-line with recommendations under SAM/2024/00054 (document cited in paragraph nine). Samples selected for PCB analysis were 1 (Figure 1 Exolum Riverside), 2 (Figure 1 Chart 1), 3 (Figure 1 Bamletts Bight), 4 (Figure 1 Chart 2), 16 (Figure 1 Navigator North Tees), 17 (Figure 1 Mid Channel), 18 (Figure 1 Exolum Seal Sands), 19 (Figure 1 Chart 8), 20 (Figure 1 Phillips Terminal) and 29 (Figure 1 Hartlepool Berths); these are representative of the area to be dredged and acceptable given that SAM/2024/00054 stated that PCB analysis “*must include a sample collected from Chart sectors 1 & 2 (Figure 1)*”. PCB analysis revealed all samples contained levels of ICES 7 and Total 25 PCB congeners less than AL1. In the absence of an AL2 for ICES 7 PCB congeners the observed levels have been compared to German Action Levels (deALs) for further investigation; all ICES 7 PCB congeners were less than their respective deAL1. The material in respect to PCBs only is acceptable for continued disposal to sea, in this case to Tees Bay A (TY160) disposal site.

### **Organochlorine pesticides**



In total ten samples were analysed for OCs, in-line with recommendations under SAM/2024/00054 (document cited in paragraph nine). Samples selected for OC analysis were 1 (Figure 1 Exolum Riverside), 2 (Figure 1 Chart 1), 3 (Figure 1 Bamletts Bight), 4 (Figure 1 Chart 2), 16 (Figure 1 Navigator North Tees), 17 (Figure 1 Mid Channel), 18 (Figure 1 Exolum Seal Sands), 19 (Figure 1 Chart 8), 20 (Figure 1 Phillips Terminal) and 29 (Figure 1 Hartlepool Berths); these are representative of the area to be dredged and acceptable given that SAM/2024/00054 stated that OC analysis “*must include a sample collected from Chart sector 1 & 8, Navigator North Tees and Hartlepool Berths (Figure 1)*”. Only one sample, sample 3, had levels of DDT<sup>1</sup> greater than AL1 whilst all other samples contained levels of DDT and Dieldrin less than their respective AL1. In the absence of an AL2 for DDT and Dieldrin OCs and no agreed ALs for the remaining OCs, the levels have been compared to deALs. This analysis revealed that sample 3 was greater than deAL1 but less than deAL2 for DDT. Levels of DDE<sup>2</sup> are greater than deAL1 but less than deAL2 in five samples (1, 2, 3, 4 and 16) whilst all remaining samples observed levels of OCs less than their respective deAL1. The material in respect to OCs only is acceptable for continued disposal to sea, in this case to Tees Bay A (TY160) disposal site.

### **Polybrominated diphenyl ethers**

In the absence of agreed ALs for PBDEs, Cefas use the best available evidence for assessment and therefore refer to the recommendations in Mason *et al.* (2022), however, it should be noted that these recommended guidelines are not formally agreed ALs and their use is therefore advisory. The analysis indicates BDE209<sup>3</sup>, BDE99<sup>4</sup> and BDE100<sup>5</sup> at levels greater than their respective higher assessment criteria (HAC) in 23, 19 and one sample sites, respectively. The analysis indicates BDE100, BDE99, BDE209 and BDE85<sup>6</sup> at levels greater than their respective lower assessment criteria (LAC) but less than the HAC in 16, nine, five and one sample sites, respectively. The remaining samples contain PBDE congener levels below their respective LAC. Alongside this, no Total Organic Carbon (TOC) data is available to characterise a sediment sample alongside the PBDE results, and thus I am unable to normalise the PBDE results provided; a nominal value of 2.5% TOC for normalisation has been used for this assessment. However, if values of TOC for the samples are greater than 2.5% the levels would be reduced. TOC Values for the Tees in the past have seen levels greater than 3%, therefore the risk may potentially be lower than the levels observed. The levels for BDE209 and BDE99 are displayed in Figures 6 and 7 below. Overall, the PBDE concentrations alone from across the dredge area raise concern for disposal at sea from risk to the marine environment.

<sup>1</sup> Dichlorodiphenyltrichloroethane

<sup>2</sup> 1,1-Dichloro-2,2-bis(p-chlorophenyl) ethylene

<sup>3</sup> 2,2',3,3',4,4',5,5',6,6'-decabrominated diphenyl ether

<sup>4</sup> 2,2',4,4',5-pentabromodiphenyl ether

<sup>5</sup> 2,2',4,4',6-penta-bromodiphenyl ether

<sup>6</sup> 2,2',3,4,4'-Pentabromodiphenyl ether



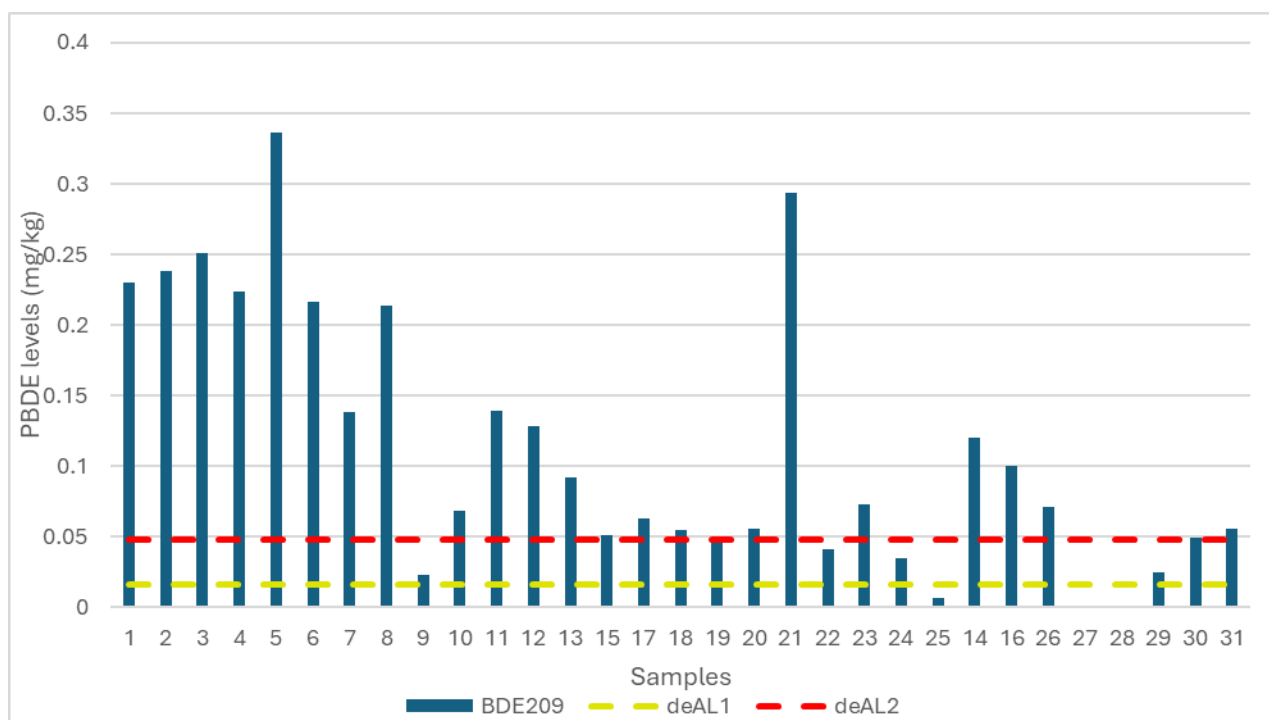


Figure 6: Levels of BDE209 across the Tees and Hartlepool in 2024 (obtained from documents cited in paragraphs seven and eight).

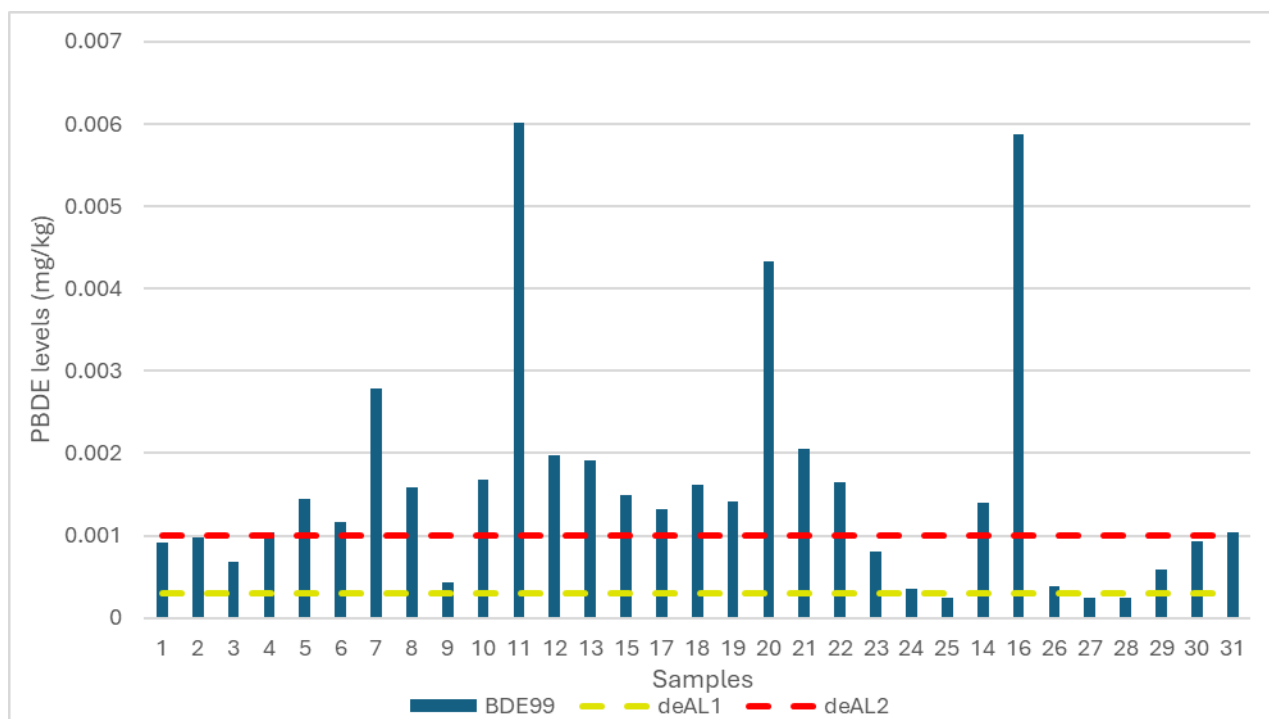


Figure 7: Levels of BDE99 across the Tees and Hartlepool in 2024 (obtained from documents cited in paragraphs seven and eight).

Material in the river Tees are known to exhibit elevated PBDE levels above the LOD due to the historic manufacture of these chemicals in the area (Assunção *et al.*, 2020; Boon *et al.*, 2002; Law *et al.*, 2006) and therefore for a more appropriate assessment the current levels have been compared to historical values taken from across the dredge area throughout the current



marine licence to provide further local and regional context; these are visualised in Figures 8 and 9 below.

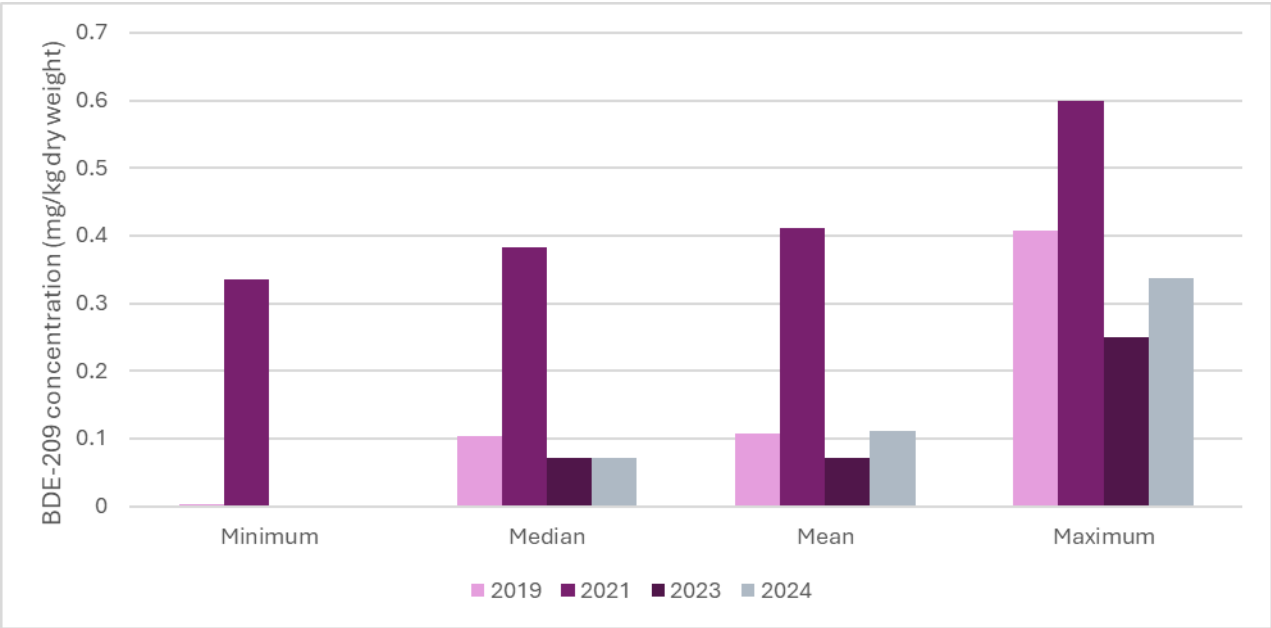


Figure 8: BDE209 comparison within Tees and Hartlepool from 2019 – 2025.

The levels of BDE209, as indicated by Figure 8, have remained similar across the years with the exception of 2021 which were elevated in comparison. Whilst the levels are still concerning it indicates that levels are still within the recorded range.

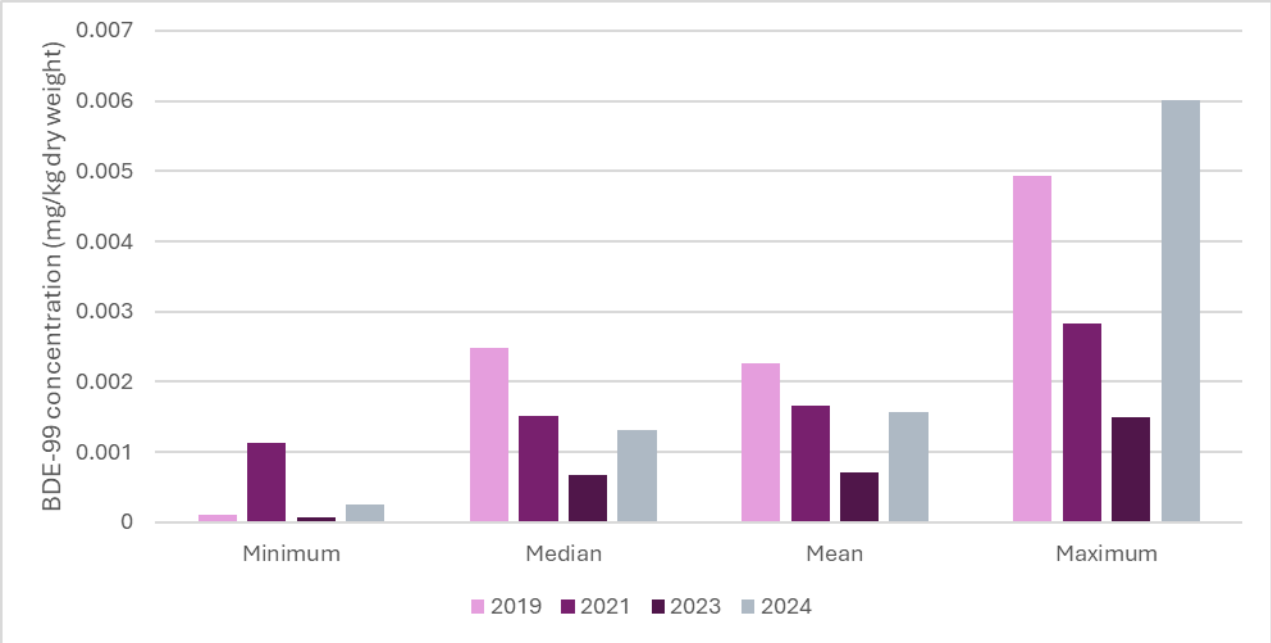


Figure 9: BDE99 comparison within Tees and Hartlepool from 2019 – 2025.

The levels of BDE99, as indicated by Figure 9, on the whole in regards to minimum, maximum, mean and median are in a similar region with the exception of the maximum concentrations observed this year at two sites, Sample 11 (Figure 1 Chart 6; 0.00602 mg/kg) and sample 16 (Figure 1 Navigator North Tees; 0.00588 mg/kg), which have indicated levels higher than

previously noted maximums for samples in the river Tees. Alongside this sample 20 (Figure 1 Phillips Terminal; 0.00433 mg/kg) was observed at levels close to the 2019 maximum. This is concerning and indicates that the levels of BDE99 are higher than previously noted for samples within the river Tees.

It should be noted that the sampling numbers for each year vary for PBDEs and therefore differences could be due to sampling variation e.g. 2023 had ten samples, 2021 had nine whilst 2024 and 2019 had over 30 samples each which will affect averages and thus results are not directly comparable.

Given the above, levels of PBDEs pose a high risk to the marine environment at some sites. Overall, my opinion is that the levels of BDE209 and BDE99 observed in the 2024 data pose a potentially unacceptable risk to the marine environment. However, the levels for all other BDE congeners and other contaminants analysed do not preclude the material from disposal to sea. Given that the levels of BDE209 and BDE99 appear to be lower or generally consistent with the levels observed in previous years (excluding the BDE99 maximum) and given that the elevated presence of PBDEs in the river Tees that can be traced to historic industrial inputs the material whilst of concern may be allowed for disposal, in this case to Tees Bay A (TY160) disposal site. However, to evidence the impact of the disposal activity with contaminants at these levels it would be prudent to undertake a site-specific monitoring survey to look at impacts in the sediment flora and fauna around the area of the disposal site. I recommend that Tees Bay A (TY160) disposal site and the wider area, is flagged for future monitoring by the MMO.



## References

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